To: "Sean Dempsey" <sdempsey@google.com>
From: "Shumeet Baluja" <shumeet@google.com>
Cc: "Michele Covell" <covell@google.com>, "Peter Norvig" <pnorvig@google.com>, "Jay Yagnik" <jyagnik@google.com>
Bcc:
Received Date: 2006-11-20 03:01:30 GMT
Subject: Re: audible magic

Sean,

We have a fully working prototype that has beaten the recognition rates/efficieny rates of all of what has been published (including the engine that gracenote was originally based on), as well as a recently published extension by some researchers at cmu.

The system we built, called *waveprint*, was designed to satisfy three needs:

1. detection of a known audio signal -- i.e. like dmarc would use. (did this advertisement play when it was supposed to?)
2. recognition of a new audio signal from a large set of audio signals - i.e. copyright detection.
3. playback recognition on cell phones (i.e shazaam).

The only caveat is that we've been using a cobbled together testing set of private mp3s and audio data. In order to fully determine the efficacy we need to get more data (which has been inordinately hard to do at google, but with youtube, will hopefully get much easier). However, assuming more data tests go well (which i view as high probability, but obviously not a certainty until it is tried), the system could be used in stand-alone production in 3-4 months with the appropriate small resources. We are already (mainly jay yagnik) working with a few members of the video team to productionize the system for youtube.

If youtube folks have data to try out on, we should arrange a meeting with them to talk and show them what we have.

On a parting note, fwiw, i suspect that it will not be the technology that you necessarily will decide on. I firmly believe we can (if we have not already) do better than the systems you are looking at, given the approach that we've found. However, indemnification and partner handling are sometimes best done through partnerships as opposed to acquisitions/in-house; these i believe will be the largest motivating factors, and may be a very good reason to keep the systems/guarantees at an arms length.

Nonetheless, if you decide to move forward with dd on magix or gracenote, let me know, i'd be happy to help out with diligence as needed.

best,
shumeet

p.s. If you don't mind, could you please pass on the attached papers to anyone who might be interested (in the tech details); these provide details

of our results.

our original, published paper:
http://www.esprockets.com/papers/cvmp_BalujaCovell.A4color.pdf
submited papers: 2 short ones are attached.

On 11/19/06, Sean Dempsey <sdempsey@google.com> wrote:
>
> Shumeet, I understand from mike pearson that you have built (or are
> working on) a fingerprinting technology. the thread below discusses the
> idea of acquiring a company like audible magic, who youtube is using, or
> gracenote for this kind of tech. can you tell me how your project
> compares? thanks
>
> ---------- Forwarded message ----------
> From: Salar Kamangar [redacted]
> Date: Nov 17, 2006 10:21 AM
> Subject: Re: audible magic
> To: chris@youtube.com
> Cc: Salman Ullah [redacted] peterch@google.com , Steve Chen <
> steve@youtube.com>, Chad Hurley < chadh@youtube.com>, Sean Dempsey <dempsey@google.com
> > >
>
> an analogue for us it the IP/geo database we've built up. we started off
> by licensing data, but saw that we could make it much better with the data
> that we uniquely were collecting. unlike IP/geo data, the fingerprinting is
> less of a commodity right now, but would be nice for us to own, especially
> if we can do it in a way that content owners would trust. (we could do this
> by being aggressive about continuing this as a service to other companies,
> and making available our improvements to others.)
>
> --salar
>
>
> On 11/17/06, Chris Maxcy <chris@youtube.com > wrote:
> > >
> > > A few additional thoughts:
> > >
> > >
> > >
> > > 1) One of the other key differentiators for Audible is the fact that
> > > they have a great reputation with the Music and Movie industry. Their CEO,
> > > Vance Ikezoye, literally has relationships with all the top labels & studios
> > > so there is a big intangible built into their value (IMHO).
> > >
> > >
> > >
> > > 2) The ASP system we are licensing from Audible is a "black box" where
> > > we can't influence the underlying database. Content owners maintain a
> > > direct relationship with Audible and seem to like the idea of a trusted 3
> > > rd party watching after their interests.
> > >
> > >
> > >

> > 3) Having said all that, the fingerprint database is extremely valuable
> > and I'd see this as core strategic for Google/YouTube. If we look to a
> > buy/build model the key will be providing a system that content owners (a)
> > trust and (b) providing something that the content owners will find useful
> > beyond Google/YouTube since it takes resources for these companies to engage
> > with Audible or Gracenote in the first place.
> >
> >
> >
> > Thanks,
> >
> >
> >
> > Chris
> > ----------
> >
> > *From:* Salman Ullah [redacted]
> > *Sent:* Friday, November 17, 2006 8:39 AM
> > *To:* peterch@google.com
> > * Cc: *Steve Chen; Chad Hurley; Salar Kamangar; Maxcy Chris; Sean
> > Dempsey
> > *Subject:* Re: audible magic
> >
> >
> >
> > sean will follow up
> >
> > On 11/16/06, *Peter Chane* < peterch@google.com> wrote:
> >
> > thanks. gracenote has been on the block for a while; we've been asked
> > to take a look numerous times but passed. perhaps this is a good time to
> > re-evaluate that with someone from salman's team helping us given that
> > you've done technical evaluation on these companies already.
> >
> > On 11/16/06, *Steve Chen* < steve@youtube.com > wrote:
> >
> > there are a few companies out there providing this acoustic
> > fingerprinting technology. the other notable one is gracenote. in our
> > evaluation, we went with audible magic because while they were less accurate
> > (by a small margin), they supported an ASP model whereas gracenote required
> > us to buy 100+ machines to support it. we intended to go with audible magic
> > in the short-term and develop something in-house in the long-term.
> >
> >
> >
> > also, as this technology only looks at audio and it was primarily built
> > for detecting music, i'm not sure how well it would work for certain
> > content, like tv shows. ie, we have never tested this with, say, an episode
> > of "24".
> >
> >
> >
> > -s
> >
> >
> >
> >
> >

> >
> >
> > On Nov 16, 2006, at 11:32 PM, Chad Hurley wrote:
> >
> >
> >
> > yes, this could potentially be a very powerful acquisition. we have
> > discussed this possibility with a few people on your BD side... but i don't
> > know the current status. chris has the best insight into the details.
> >
> >
> >
> > -chad
> >
> >
> >
> >
> >
> > On Nov 16, 2006, at 11:13 PM, Peter Chane wrote:
> >
> >
> >
> > hi - i dont know the terms of your deal with audible magic but it seems
> > that the asset they are building - a database of content fingerprints - is a
> > very useful asset not only to Youtube but also to Google websearch.
> >
> > for example we could run all the videos we find on the web through this
> > database and tell content providers where their content exists on the web
> > and stats (referral clicks from google) related to it.
> >
> > this seems like useful data that could help our video efforts overall;
> > if we could tell a content provider that their content is all over the web
> > and mostly un-monetized they might be more interested in using our Adsense
> > for video syndication service to capture monetization associated with these
> > playbacks. also this data could help search; if we find videos on the web
> > w/o metadata and they match a fingerprint in the audible magic database we
> > then know what the video is. i'm sure we can think of other applications
> > for this fingerprint database.
> >
> > also, we're uniquely set up to populate this database quickly. we have
> > the ability to record 100s of channels of television and feed that data into
> > a fingerprint database.
> >
> > have you considered buying audible magic?
> >
> > thx,
> > p.
> >
> >
> > --
> > Peter Chane
> > peterch@google.com
> > Group Business Product Manager
> > Google Video | http://video.google.com
> >
> >
> >
> >

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> > --
> > Peter Chane
> > peterch@google.com
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> >
>
>
>
> --
> Sean C. Dempsey
> Principal, Corporate Development
> Google Inc.
> [redacted]
> [redacted]
> dempsey@google.com

--
shumeet baluja
google, inc.
[redacted]

Attachments:

baluja.pdf
ICASSP-detection_CB-1.pdf